ASTRONOMY AND ASTROPHYSICS

A European Journal

Volume 27 1973

Published by Springer-Verlag Berlin · Heidelberg · New York
on behalf of the Board of Directors

Astronomy and Astrophysics A European Journal

Board of Directors

Chairman: A. Blaauw (ESO)
Vice Chairman: H. Elsässer (Germany)
Secretary and Treasurer: vacancy
Y. Andrillat (France)
L. Biermann (Germany)
H. G. van Bueren (The Netherlands)
H. C. van de Hulst (The Netherlands)
R. Kippenhahn (Germany)
J. Kovalevsky (France)
G. Larsson-Leander (Sweden)
W. Priester (Germany)
A. Reiz (Denmark)
L. Rosino (Italy)
E. Schatzman (France)
G. Setti (Italy)
J. L. Steinberg (France)
U. Steinlin (Switzerland)
A. G. Velghe (Belgium)

Editors-in-Chief 1973-75

J. Heidmann
Observatoire de Meudon
92190 Meudon (France)

S. R. Pottasch
Kapteyn Astronomical Institute
P. O. Box 800
Groningen 8002 (The Netherlands)

Editing Secretaries

Mrs. F. Axisa
Miss B. Perche
Mrs. C. E. Kremer

Board of Editors

K. Bahner (Heidelberg)
J. E. Baldwin (Cambridge)
B. Baschek (Heidelberg)
W. Becker (Basel)
E. J. Blum (Meudon)
K. H. Böhm (Seattle)
J. Borgman (Roden)
E. M. Burbidge (Hailsham)
G. M. Clemence (New Haven)
O. J. Eggen (Woden)
W. Fricke (Heidelberg)
V. L. Ginzburg (Moscow)
M. Hénon (Nice)
J. T. Jefferies (Honolulu)
F. D. Kahn (Manchester)
F. J. Kerr (Maryland)
K. O. Kiepenheuer (Freiburg)
H. van der Laan (Leiden)
P. Ledoux (Liège)
J. Lequeux (Meudon)
P. O. Lindblad (Stockholm)
L. Mestel (Manchester)
P. G. Mezger (Bonn)
B. Morando (Paris)
F. Pacini (Frascati)
B. E. J. Pagel (Hailsham)
L. Plaut (Groningen)
F. Praderie (Meudon)
M. S. Roberts (Green Bank)
M. Schmidt (Pasadena)
F. Spite (Meudon)
A.B.Underhill (Goddard Space Flight Center)
H. Van Regemorter (Meudon)
L. Woltjer (New York)
J. P. Zahn (Nice)
C. Zwaan (Utrecht)

The exclusive copyright © for all languages and countries, including the right for photomechanical and any other reproduction, also in microform, is vested in European Southern Observatory (ESO).
The use of registered names, trademarks, etc. in this publication does not imply, even in the absence of a specific statement, that such names are exempt from the relevant protective laws and regulations and therefore free for general use.

Springer-Verlag · Berlin · Heidelberg · New York
Printed in Germany
Printers: Brühlsche Universitätsdruckerei, Giessen

Volume 27 1973

Contents

Stars and Stellar Evolution

HEINTZMANN, H., KUNDT, W., SCHRÜFER, E.: Pulsar Slowdown. I. Inside Rotating Neutron Stars 45
PETERSEN, J. O.: Masses of Double Mode Cepheid Variables Determined by Analysis of Period Ratios 89
FOSBURY, R. A. E.: Stellar Chromospheric Velocity Fields and the Width Luminosity Relations 129
(RN) FITCH, W. S.: The Beat Period and Characteristics of CY Aquarii 161
GROS, M., SACOTTE, D., PRADERIE, F., BONNET, R. M.: Analysis of the Ultraviolet Spectrum of A-type Stars Observed by the OAO II Satellite 167
BISNOVATY-KOGAN, G. S., RUZMAIKIN, A. A.: The Stability of Rotating Supermassive Stars 209
TORRES, C. A. O., FERRAZ MELLO, S.: On Variable dMe Stars 231
PRENTICE, A. J. R.: On Turbulent Stress and the Structure of Young Convective Stars 237
BIERMANN, P., HALL, D. S.: A Model to Explain Alternate Period Changes in Algol-like Binaries 249
DUMONT, S., HEIDMANN, N.: Effect of the Absorbers upon the Thermal Structure of a LTE Atmosphere, Hydrogen and Helium 273
BAGLIN, A., VAUCLAIR, G.: Evolutionary Sequence for DA, DB, DC White Dwarfs 307
LAUTERBORN, D.: Multiple Solutions of the Equations of Stellar Structure. II. E Model Sequences 323
DESIKACHARY, K.: Light Variation of the Delta Scuti Variable HR 1287 331
SCHMIDT, J.: Hydrodynamic Model Calculations for Supermassive Stars III. The Collapse and Explosion of a Slowly Rotating $7.5 \times 10^5 M_\odot$ Object 351
HANSEN, L.: Calibration of Luminosity Criteria for G and K Giants by Means of Trigonometric Parallaxes 355
HESSE, K. H.: Pulse Profile Variations in PSR 0329 + 54 at 2695 MHz 373
MULLAN, D. J.: Fast Rotation of Metal-poor Stars 379
WEIDELT, R. D.: Mass Loss from Rotating Stars 389
DOAZAN, V.: Long Time Variations of the Shell Star 88 Herculis 395
GLIESE, W.: The Correlation between Ultraviolet Excess and Deviation from the Mean Main-sequence 429
(RN) DEGEWIJ, J.: *UBV* Photoelectric Photometry of the Magnetic Variable Star HD 133029 473

Galactic Structure, Stellar Dynamics, Interstellar Matter

BONSIGNORI-FACONDI, S. R., SALTER, C. J., SUTTON, J. M.: The Bologna 408 MHz Pulsar Search 67
VERSCHUUR, G. L.: Galactic Spiral Structure from 21-cm Data: a New Map 73
GREWING, M., LAMERS, H. J., WALMSLEY, C. M., WULF-MATHIES, C.: UV Interstellar Absorption Lines in the Spectrum of γ^2 Vel 115
GORDON, K. J., GORDON, C. P.: Measurements of Neutral-Hydrogen Absorption in the Spectra of Eight Pulsars 119
ISRAEL, F. P., HABING, H. J., JONG, T. DE: Aperture Synthesis Observations of H II Regions. I. A Group of H II Regions around $l = 111°$ 143
MAYER, F., MARTINET, L.: Orbits and Integrals of Motion for Old Galactic Population Stars. II. Periodic and Non-periodic Orbits in the 2nd Schmidt Potential 199
GAMMELGAARD, P., RUDKJØBING, M.: Observations in Linearly Polarized Light of the Intensity of the Diffuse λ 6180 Absorption Band in 49, O, B, and A Stars 261
CRÉZÉ, M., MENNESSIER, M. O.: An Attempt to Interpret the Mean Properties of the Velocity Field of Young Stars in Terms of Lin's Theory of Spiral Waves 281
(RN) FEIBELMAN, W. A.: Linear Polarization in the Orion-Nebula 317
(RN) ANDRIESSE, C. D., OLTHOF, H.: On the Infrared Emission of H II Regions Due to Dust 319
SIMONSON, S. C., III, MADER, G. L.: Motions near the Galactic Center and the "3-kpc arm" 337
ELLIOTT, K. H., MEABURN, J.: Electronographic Observations of the [O II] Ratio in the Core of the Orion Nebula 367
VERSCHUUR, G. L.: Bending of the Galactic Plane and the Nature of the High Velocity Clouds 407
CROVISIER, J., FILLIT, R., KAZÈS, I.: On the Identification of the Radiosource G 355.3 + 0.1 with NGC 6383 417
BARBIER, M., BERNARD, A., BIGAY, J. H., GARNIER, R.: Galactic Structure in the Direction of Cepheus 421

Dyson, J. E.: The Shapes of Neutral Globules Associated with Diffuse Nebulae 459
(RN) Finzi, U.: A Thermodynamic Instability Criterion Applied to One Dimensional Stellar Systems 467

Galaxies, Cosmology

Icke, V.: Formation of Galaxies inside Clusters 1
Deinzer, W., Schmidt, Th.: A Model for the Magnetic Field of the Magellanic System 85
Alloin, D.: Physical Conditions in Nuclei of Spiral Galaxies. I. Study of Galaxies with a Nuclear Radio-component 433
Jaakkola, T.: The Relation between Redshift and Surface Brightness for Normal Galaxies in Systems of Galaxies 449
(RN) Pauliny-Toth, I. I. K., Preuss, E., Witzel, A., Kellermann, K. I., Fomalont, E. B., Davis, M. M.: 1633 + 38: a Radio Source with a Strong, Compact Component 475

The Sun

Grevesse, N., Sauval, A. J.: A Study of Molecular Lines in the Solar Photospheric Spectrum 29
Nakagawa, Y.: A Practical Representation of the Solar Magnetic Field 95
Burton, W. M., Jordan, C., Ridgeley, A., Wilson, R.: Further Observations of the Structure of the Chromosphere-corona Transition Region from Limb and Disk Intensities 101
Chabás, J.: An Analytical Approach to the Solar Neutrino Fluxes 125
Frisch, H.: Coupling between Thermal Conduction and Radiative Transfer in a Moving Atmosphere 223
Holt, J. N., Hearn, A. G.: The Inversion of the Mean and Spatially Resolved Sodium D_2 Line Profiles from the Sun 297
Kerdraon, A.: Observations of Type I Bursts at 169 MHz and Coronal Scattering 361

Physical Processes and Astrophysical Plasmas

(RN) Biémont, E., Grevesse, N.: Atomic Wavelengths and Transition Probabilities in the Infrared 163
Hua, C. T.: Čerenkov Radiation as a Standard Source for Rocket Experiment 255
Gehren, T.: An Interpolation Method for the Solution of Non-LTE Line Transfer Problems 291
Nussbaumer, H.: Pitfalls of Configuration Interaction: Transition Probabilities in Fe XIII 303
Parèsce, F., Bowyer, S.: Resonance Scattering from Interstellar and Interplanetary Helium 399
Salvati, M.: On Self-consistent Models for the Pulsar Magnetosphere 413

Planetary System

Keller, H. U.: Hydrogen Production Rates of Comet Bennett (1969i) in the First Half of April 1970 51

Celestial Mechanics and Astrometry

Zikides, M. K.: Some Families of Periodic Orbits in the Restricted Three-body Problem 23
Lieske, J. H.: On the 3–7 Commensurability between Jupiter's outer Two Galilean Satellites 59
(RN) Kaufmann, J. P., Klippel, E.: The Orbit of the Double-line Spectroscopic Binary HD 126983 469

Instruments and Data Processing

Ekers, R. D., Allen, R. J., Luyten, J. R.: Interactive Processing of Map Data Produced by the Westerbork Supersynthesis Radio Telescope 77
Sareyan, J. P., Ischi, E.: A Study of the Physics and Non-linear Effects in Photomultipliers 183
Piirola, V.: A Double Image Chopping Polarimeter 383

Errata

Brini, D., Evangelisti, F., Fuligni di Grande, M. T., Pizzichini, G., Spizzichino, A., Vespignani, G. R.: Hard X-ray Solar Bursts Observed from the OSO-6 Satellite 479
Bruyn, A. G. de: A High-sensitivity Search for Radio Emission from Young Extragalactic Supernova Remnants at 1415 MHz 481
Willis, A. G.: Observations of Galactic Supernova Remnants at 1.7 and 2.7 GHz 483

Abstracts of Articles which will be Published in A. A. Suppl. 12, No. 1

Brandi, E., Clariá, J. J.: Southern Peculiar Stars with Abnormal Spectra 165
Frieboes-Conde, H., Herczeg, T.: Period Variations of Fourteen Eclipsing Binaries with Possible Light-Time Effect 165
Häggkvist, L.: *UBV* Sequences in Six of Kapteyn's Selected Areas 165
Gallouët, L., Heidmann, N., Dampierre, F.: Optical Positions of Bright Galaxies. II 165
Couteau, P.: Orbits of Five Visual Binaries 165
Couteau, P.: New Double Stars (10th Series) Discovered at Nice 165

Abstracts of Articles which will be Published in A. A. Suppl. 12, No. 2

Burton, W. B., Verschuur, G. L.: Observations of Neutral Hydrogen near the Galactic Plane 322
Giovanelli, R., Verschuur, G. L., Cram, T. R. : High Resolution Studies of High Velocity Clouds of Neutral Hydrogen 322
Verschuur, G. L., Cram, T. R., Giovanelli, R.: High Resolution Observations of Interstellar Neutral Hydrogen: Data Taking and Presentation 322
Guibert, J.: A Neutral Hydrogen Survey of the Andromeda Nebula 322

(Indexed in Current Contents)

Author-Index

Allen, R.J. 77
Alloin, D. 433
Andriesse, C.D. 319

Baglin, A. 307
Barbier, M. 421
Bernard, A. 421
Biémont, E. 163
Biermann, P. 249
Bigay, J.H. 421
Bisnovaty-Kogan, G.S. 209
Bonnet, R.M. 167
Bonsignori-Facondi, S.R. 67
Bowyer, S. 399
Brandi, E. 165
Brini, D. 479
Bruyn, A.G.de 481
Burton, W.B. 322
Burton, W.M. 101

Chabás, J. 125
Clariá, J.J. 165
Couteau, P. 165
Cram, T.R. 322
Crézé, M. 281
Crovisier, J. 417

Dampierre, F. 165
Davis, M.M. 475
Degewij, J. 473
Deinzer, W. 85
Desikachary, K. 331
Doazan, V. 395
Dumont, S. 273
Dyson, J.E. 459

Ekers, R.D. 77
Elliott, K.H. 367
Evangelisti, F. 479

Feibelman, W.A. 317
Ferraz Mello, S. 231
Fillit, R. 417
Finzi, U. 467
Fitch, W.S. 161
Fomalont, E.B. 475
Fosbury, R.A.E. 129
Frieboes-Conde, H. 165
Frisch, H. 223
Fuligni di Grande, M.T. 479

Galluet, L. 165
Gammelgaard, P. 261
Garnier, R. 421
Gehren, T. 291
Giovanelli, R. 322
Gliese, W. 429
Gordon, C.P. 119
Gordon, K.J. 119
Grevesse, N. 29, 163
Grewing, M. 115
Gros, M. 167
Guibert, J. 322

Habing, H.J. 143
Häggkvist, L. 165
Hall, D.S. 249
Hansen, L. 355
Hearn, A.G. 297
Heidmann, N. 165, 273
Heintzmann, H. 45
Herczeg, T. 165
Hesse, K.H. 373
Holt, J.N. 297
Hua, C.T. 255

Icke, V. 1
Ischi, E. 183
Israel, F.P. 143

Jaakkola, T. 449
Jong, T.de 143
Jordan, C. 101

Kaufmann, J.P. 469
Kazès, I. 417
Keller, H.U. 51
Kellermann, K.I. 475
Kerdraon, A. 361
Klippel, E. 469
Kundt, W. 45

Lamers, H.J. 115
Lauterborn, D. 323
Lieske, J.H. 59
Luyten, J.R. 77

Mader, G.L. 337
Martinet, L. 199
Mayer, F. 199
Meaburn, J. 367
Mennessier, M.O. 281
Mullan, D.J. 379

Nakagawa, Y. 95
Nussbaumer, H. 303

Olthof, H. 319

Paresce, F. 399
Pauliny-Toth, I.I.K 475
Petersen, J.O. 89
Piirola, V. 383
Pizzichini, G. 479
Praderie, F. 167
Prentice, A.J.R. 237
Preuss, E. 475

Ridgeley, A. 101
Rudkjøbing, M. 261
Ruzmaikin, A.A. 209

Sacotte, D. 167
Salter, C.J. 67
Salvati, M. 413
Sareyan, J.P. 183
Sauval, A.J. 29
Schmidt, Th. 85
Schmidt, J. 351
Schrüfer, E. 45
Simonson, S.C., III 337
Spizzichino, A. 479
Sutton, J.M. 67

Torres, C.A.O. 231

Vauclair, G. 307
Verschuur, G.L. 73, 322, 407
Vespignani, G.R. 479

Walmsley, C.M. 115
Weidelt, R.D. 389
Willis, A.G. 483
Wilson, R. 101
Witzel, A. 475
Wulf-Mathies, C. 115

Zikides, M.K. 23